

Persistent effects of social and emotional skills on students' achievement: evidences from Brazil

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Abstract

The contemporaneous formation of non-cognitive and cognitive skills has hampered research in this literature to make causal inferences, even though the association between these two skills has proven to be strong. The present work contributes to this literature by showing how social and emotional skills measured at a given point in time predict the evolution of test scores during the next year. For that, we take advantage of a rich database that contains quarterly indicators of Brazilian students' cognitive development, as well as a large-scale application of a social and emotional assessment. We find that while extraversion has negative impacts, especially for reading, conscientiousness and openness have large and positive effects on both reading and math. Most important, these impacts do not fade out with time and actually seems to increase for some constructs across time. We believe this research sheds light on the importance of school programs that encourage the acquisition of social and emotional skills as a way to decrease inequality on future outcomes.

1 Introduction

Recent research on the determinants of well-being in its multiple dimensions has placed social and emotional skills in a privileged position in the debate. Professional success is strongly and increasingly influenced by the accumulation of such attributes, and the increase in the returns

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to the so-called soft skills account for an important portion of the increase in wage inequality in developed economies¹. Similar evidence has also emerged for developing countries, emphasizing the lack of social and emotional skills as an important obstacle to economic growth². Health and family outcomes such as marital status, involvement with tobacco and alcohol, overweight, general and mental health and practice of physical exercise are predicted by almost all of the Big Five personality factors, above and beyond the relative importance of IQ³.

Although social and emotional skills may have a direct impact on adult life outcomes, most investigators agree that a substantial fraction of their benefits come through education⁴. In fact, a large body of literature documents significant statistical associations between educational indicators and measurements of social and emotional skills, as well as impacts of interventions designed to foster socioemotional skills on cognitive outcomes⁵. Nonetheless, only a few of these papers can convincingly estimate the *ceteris paribus* effect of social and emotional skills on the cognitive development, especially due to the simultaneity in the development of both types of skills. Attempts in this direction typically rely on the use of longitudinal data and assumptions about the dynamics of skill accumulation, and have generally found that an increment in a certain type of ability feeds back in the accumulation of the others⁶.

In this paper, we contribute to the literature on skill formation by showing how social and emotional skills measured at a given point in time predict the evolution of test scores during the next year. In most related research, the data contains only low-frequency indicators of the cognitive development, which makes it harder to understand the mechanisms through which learning effectively occurs. We are able to observe it quarterly during a whole high school year. Furthermore, our data also contains a rich socioeconomic set of variables that allows us to control for common confounding effects associated with the fact that low social and emotional status could often mask poor socioeconomic conditions. In our statistical models, we use a multilevel structure to account for random school effects on learning, and find that social and emotional variables predict cognitive evolution even after controlling for the previous grade of the subjects. The effects also seem to be cumulative over time for the social and emotional skills often considered important for learning, such as openness to new experiences

¹See Almlund et al. (2011), Balcar (2014), Deming (2017), Autor et al. (2003), Autor et al. (2008), Autor and Handel (2013)

²Busso et al. (2012)

³Almlund et al. (2011), Savelyev and Tan (2017)

⁴See Lundberg (2017) for a recent discussion on the subject.

⁵Almlund et al. (2011), Durlak et al. (2011), Taylor et al. (2017)

⁶Heckman popularized the expression skill begets skill, and found empirical support for this assumption in Cunha et al. (2010)

and conscientiousness. In other words, the distance between two individuals with different baseline levels of social and emotional skills (and otherwise observational identical) seems to increase over time in the following grade. Finally, we provide conditions in a simultaneous equations model that would suffice to give a causal interpretation to our estimates.

Our analysis is based on a rich and unique dataset that contains a large-scale application of a social and emotional assessment (SENNA 1.0) together with a socioeconomic questionnaire in a representative sample of about 5,400 freshmen high school students of the Brazilian state of Rio de Janeiro in the last quarter of 2013. We then merged the data with a longitudinal database of test scores containing quarterly results from 2013 and 2014, which allows us to use previous performance as control variables in our regressions.

Our results will have direct policy implications in a country that is now deeply discussing the inclusion of social and emotional development among the official goals of public education⁷. We not only show that social and emotional skills indeed booster learning, but also that differences in social and emotional status probably have long-term consequences.

The paper is organized as follows. After this introduction, we present in section 2 a model of skill formation and what are the conditions for identifying the impact of social and emotional skills on cognitive ones. We show that a reduced form of this model can be used to identify the impact of previous social and emotional skills on future school outcomes. Next, we present our data and empirical strategy. Section 4 brings the results and section 5 briefly concludes.

2 A simple model of skill formation

Consider the problem of estimating the following simultaneous equation model of skill formation, in which there are a cognitive and a social and emotional traits, (θ, S) that causally determine one another:

$$\theta = b_0 + \beta S + \varepsilon \tag{1}$$

$$S = c_0 + \delta \theta + v \tag{2}$$

For simplicity, assume (ε, v) are independent, idiosyncratic shocks with variances $\sigma_\varepsilon^2, \sigma_v^2$.

⁷The Federal Council of Education approved the inclusion of the social and emotional skills in the national curriculum in 2017, and many states are now implementing special training to the teachers to accomplish with this mission.

As it is standard in these models, the first equation could not be consistently estimated by least squares regressions from a cross-section of information on (θ, S) , since the unobservable component, ε , is clearly correlated with the endogenous regressor S :

$$\text{cov}(S, \varepsilon) = \left(\frac{\beta}{1 - \beta\delta}\right)\sigma_\varepsilon^2 \neq 0 \quad (3)$$

Suppose now that we expand the model to account for time dependency on the dependent variable:

$$\theta_t = b_0 + \rho\theta_{t-1} + \beta S_t + \varepsilon_t \quad (4)$$

$$S_t = c_0 + \gamma S_{t-1} + \delta\theta_t + v_t \quad (5)$$

We will now show that the structural coefficients of this model can be fully recovered from the estimation of the reduced form if the following assumptions are fulfilled:

- (i) Predetermination: $(\varepsilon_{t+s}, v_{t+s}) \perp (\theta_t, S_t), \forall s > t$
- (ii) Information about at least one of the skills is available for at least a baseline and two periods ahead ($T = 3$).

The system above has the matrix representation:

$$A\Theta_t = \Upsilon + B\Theta_{t-1} + \xi_t; \quad (6)$$

$$\Theta = \begin{bmatrix} \theta \\ S \end{bmatrix}; A = \begin{bmatrix} 1 & -\beta \\ -\delta & 1 \end{bmatrix}; B = \begin{bmatrix} \rho & 0 \\ 0 & \gamma \end{bmatrix}; \Upsilon = \begin{bmatrix} b_0 \\ c_0 \end{bmatrix}$$

and the reduced form

$$\Theta_t = \Phi_0 + \Phi_1\Theta_{t-1} + \epsilon_t \quad (7)$$

where

$$\Phi_0 = A^{-1}\Upsilon = \frac{1}{(1 - \beta\delta)} \begin{bmatrix} b_0 \\ c_0 \end{bmatrix}; \Phi_1 = A^{-1}B = \frac{1}{(1 - \beta\delta)} \begin{bmatrix} \rho & \beta\gamma \\ \delta\rho & \gamma \end{bmatrix}$$

can be consistently estimated by least squares provided predetermination is true. In particular, the reduced form equation for the cognitive skill will become:

$$\theta_t = \phi_{10} + \phi_{11}\theta_{t-1} + \phi_{12}S_{t-1} + \xi_{\theta t}; \quad (8)$$

We can also recursively build

$$\begin{aligned} \Theta_{t+1} &= \Phi_0 + \Phi_1(\Phi_0 + \Phi_1\Theta_t - 1 + \epsilon_t) + \epsilon_{t+1} \\ &= \Phi_0(I + \Phi_1) + \Phi_1\Phi_1\Theta_t - 1 + \Phi_1\epsilon_t + \epsilon_t + 1 \\ &= \Psi_0 + \Psi_1\Theta_{t-1} + \zeta_t \end{aligned} \quad (9)$$

and estimate the parameters (Ψ_0, Ψ_1) .

Likewise, looking in isolation to the cognitive equation, the reduced form parameters would be

$$\psi_1 = \phi_1(\phi_1 + \delta\phi_2); \psi_2 = \phi_2(\phi_1 + \frac{\phi_2}{\beta}) \quad (10)$$

It is now clear that we could recover $\delta = \frac{\psi_1 - \phi_1^2}{\phi_1\phi_2}$ and $\beta = \frac{\phi_2^2}{\psi_2 - \phi_1\phi_2}$. With knowledge of (β, δ) , we can now find $\rho = \phi_1(1 - \beta\delta)$ and $\gamma = \frac{(1 - \beta\delta)\phi_2}{\beta}$.

As shown in the next section, in our empirical analysis we estimate only reduced-form cognitive equations, where future test scores are regressed against baseline social and emotional indicators, previous test scores, and baseline covariates. Future exercises will estimate the structural model⁸. Since we have three points in the future, our structural model is in principle over identified. A similar identification analysis could be run if we had a more complex dependency of the dependent variable on its lags, but more leads of the dependent variable should then be available. In the same vein, more leads would be required if the random component, $\xi_{\theta t}$, displayed persistence (but in this case, we should discard the immediate future leads until we could re-establish the orthogonality between $\xi_{\theta t+s}$ and Θ_t). The presence of individuals' fixed effects would prevent the reduced form to be consistently estimated, and therefore our model would not be identified either. However, when thinking about individuals idiosyncrasies, the econometrician usually has in mind social and emotional skills, which is exactly what we are measuring here.

⁸Since the model is identified for two skills, its estimation would not be straightforward if we included all five socioemotional traits in the equation. Therefore, a future exercise will estimate the impact of each construct separately, including one construct at a time for the estimation of the structural model.

3 Data and Methodology

3.1 Data

The data used in this study come from two sources. The first are administrative data from 2013 and 2014 that contain performances on a diagnostic exam applied bimonthly in Rio de Janeiro state schools⁹. The second are the scores of a psychometric instrument - the first version of SENNA - and a socioeconomic questionnaire, both answered by a representative sample of students from Rio de Janeiro state schools in the last quarter of 2013.

3.1.1 SENNA's instrument

SENNA's instrument was idealized to serve as an instrument to monitor and support the formulation of public policies in Brazil, through the measurement of students' social and emotional traits. It was elaborated with two goals in mind: (a) it should be simple and robust enough to be applied to large numbers of students in order to provide a comprehensive picture of the distribution of socioemotional characteristics in Brazil; and (b) it should be precise and interpretable enough, in order to be used scientifically in studies that focus on documenting the social and emotional development of individuals over their lives' cycle.

Through exploratory factor analysis of some items of selected international psychological instruments, SENNA is able to identify five socioemotional traits¹⁰:

1. *Conscientiousness*: the tendency to be organized, hardworking and responsible. The conscientious individual is characterized as being efficient, organized, autonomous, disciplined, lacking impulse and guided towards his objectives.
2. *Extraversion*: the orientation of interests and energy towards the external world, people and things (instead of the internal world of subjective experience). The extrovert individual is characterized as being friendly, sociable, self-confident, energetic, adventurous and enthusiastic.
3. *Neuroticism*: the unpredictability and inconsistency of emotional reactions, with quick mood swings. The emotionally unstable individual is characterized as being worried,

⁹'Saerjinho', as it is known, is a bimonthly evaluation system focused on the teaching and learning process in the Rio de Janeiro state education system. At the end of every two-month period, students in the 5th and 9th grades of elementary schools and the three grades of high school take tests in a number of different disciplines.

¹⁰A detailed explanation about the methods used in the construction of SENNA is available in <http://educacaosec21.org.br/wp-content/uploads/2013/07/Social-and-emotional-developmente-and-school-learning1.pdf>

short-tempered, introspective, impulsive and lacking in self-confidence, with a tendency towards depression and anxiety disorders. The opposite pole of Neuroticism is *Emotional Stability*, which is the pole we use in this study.

4. *Agreeableness*: the tendency to act in a cooperative and unselfish manner. The agreeable or cooperative individual is characterized as being tolerant, altruistic, modest, likable, flexible and objective.
5. *Openness to New Experiences*: the tendency to be open to new aesthetic, cultural and intellectual experiences. The individual who is open to new experiences is characterized as being imaginative, artistic, excitable, curious and unconventional, whilst having a wide range of interests.

Once SENNA' instrument was developed, a large scale evaluative pilot study was conducted in the educational system of Rio de Janeiro state, in Brazil. The main objectives of this pilot were to evaluate in more details the psychometric properties of SENNA's instrument and to investigate the association of socio-emotional skills with academic achievement and standardized performance tests in Brazil.

The data was collected at the beginning of October 2013, from a probabilistic sample of students that represent the universe of state schools in Rio de Janeiro. The sample was composed of 24,605¹¹ students in the 5th grade of elementary school (6% of the sample), and the 1st and 3rd grades of high school (59% and 35% of the sample, respectively). Besides SENNA's results, the dataset also includes students' answers to questions about their individual characteristics (gender, age and race), their family environment, and their parents' behavior. The participant students came from 14 regions, 79 cities, 431 schools and 1,062 classes.

The analysis performed in the present work will use a sub-sample of roughly 5,400 students from this pilot. Those are students who were in the 1st grade in 2013 and who took all the diagnostic exams throughout 2014. Table 1 present summary statistics of this sample.

Table 2 brings the correlations between each of the five factors. These correlations are moderate, which shows a desirable property of socioemotional skills' measures. As each measure is expected to reflect only one skill, they should not be highly correlated with each other.

¹¹Approximately 9,475 students did not attend school on the day of the test. This figure includes the average number of absences recorded on normal school days added to the absences due to the teachers' strike that took place during the period in question.

Table 1: Descriptive Statistics

	Mean	SD
Boys	0.44	0.50
White	0.30	0.46
Age	15.73	0.99
Lives w/ mother	0.91	0.29
Mother education: less than 1st grade	0.05	0.23
Mother education: bw 1st and 9th grade	0.24	0.43
Mother education: bw 9th grade and HS	0.21	0.41
Mother education: bw HS and College	0.40	0.49
Mother education: College degree	0.10	0.29
Welfare Program Receiver	0.32	0.47
Observations	5417	

Note: sub-sample of students in the 1st grade in 2013 who took all diagnostic exams in 2014.

Table 2: Cross-correlation table

Variables	Conscientiousness	Extraversion	Emotional Stability	Agreeableness	Openness
Conscientiousness	1.000				
Extraversion	0.115	1.000			
Emotional Stability	0.306	0.045	1.000		
Agreeableness	0.457	0.390	0.319	1.000	
Openness	0.360	0.394	0.154	0.493	1.000

3.2 Empirical strategy

We use the intuition of the model described in section 2 to estimate a reduced form of the impact of each non-cognitive skill on students' future performance in both Reading and Math. The latter is used as a proxy for students' cognitive abilities. Our empirical strategy performs the following estimation:

$$Y_{ij,2014/k} = \beta_0 + \mathbf{Constructs}_{is,2013/3}\beta_1 + \beta_2 Y_{is,2013/3} + \mathbf{X}_{ij}\beta_3 + u_j + \varepsilon_{ij} \quad (11)$$

where $Y_{ij,2014/k}$ is the performance of student i in school j in quarter k , $k \in [1, 3]$; $\mathbf{Constructs}_{ij}$ is a vector of SENNA's constructs; \mathbf{X}_{ij} is a vector with students' characteristics (ex: sex, age, parent's education); u_j are school fixed effects (controlled by school dummies); and ε_{ij} is a

stochastic shock. This is a multilevel (or hierarchical) model that allows for within-cluster correlation, where students within the same school can be correlated as a result of a shared random intercept.

As explained in section 2, it is possible to use previous social and emotional skills to predict students' future school performance after contemporaneous feedback effects are controlled. Moreover, as we have performance measures in several different points in time, it is also possible to check how the impact of current non-cognitive skills evolves over time.

4 Results

Tables 3 and 4 bring the main results of our estimation for math and reading, respectively. All estimations are controlled by school fixed effects, as well as students' characteristics such as race, gender, age; and socioeconomic status, such as mother's education, an indicator of whether the students lives with his/her mother, and an indicator of whether the student is a recipient of the government's welfare program.

The first column of each table brings estimations without controlling for students' previous performance, which illustrates the simultaneity bias that emerges when predicting cognitive skills using solely contemporaneous socioemotional skills. While a structural estimation as the one shown in section 2 would address this problem, it is important to notice how the reduced form of that estimation also brings valuable results. That is, even after controlling for previous cognitive skills, the impact of previous social and emotional traits is still quite considerable. The next three columns show these results for students' performance in each quarter of 2014.

Analyzing the tables, one can see that three constructs have a considerable impact on cognitive skills: conscientiousness, openness and, at some extension, extraversion. Figure 1 brings the point estimate and confidence interval of these three more prominent constructs in order to facilitate their interpretation. The first thing to be noticed is that, while conscientiousness and openness have a positive impact on both math and reading, the impact of extraversion is negative, and more so for reading than for math (for math, in fact, it is only significantly different from zero at less than 5% level in the first quarter). This negative impact might be due to the fact that extraversion boosts social initiative, which can take students away of more solitary study activities toward more rewarding group activities, reducing the time spent on the task of learning¹².

¹²Other studies, such as Poropat (2009) and De Raad and Schouwenburg (1996), have found an ambiguous

Table 3: Main results for Reading

	(1)	(2)	(3)	(4)
Conscientiousness	0.096*** (0.015)	0.046*** (0.013)	0.036*** (0.012)	0.025** (0.012)
Openness	0.128*** (0.018)	0.060*** (0.015)	0.066*** (0.014)	0.075*** (0.014)
Extraversion	-0.100*** (0.015)	-0.064*** (0.014)	-0.042*** (0.013)	-0.059*** (0.012)
Emotional Stability	0.017 (0.015)	0.002 (0.014)	0.012 (0.013)	0.020 (0.013)
Agreeableness	-0.004 (0.018)	0.017 (0.016)	-0.005 (0.014)	0.003 (0.013)
School Fixed Effects	Yes	Yes	Yes	Yes
Control for mother's education & SES	Yes	Yes	Yes	Yes
Control for performance in 2013	No	Yes	Yes	Yes
Quarter	1	1	2	3
Observations	5417	5417	5417	5417

Notes: (i) Standard errors clustered at school level; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (iii) Both the constructs and the dependent variables are standardized with mean zero and unitary standard-deviation. Results regard students from the 1st grade of High School, interviewed during October 2013. Estimations are controlled for students' main characteristics (race, gender, age) and socioeconomic conditions (mother's education, indicator of whether student lives w/ mother, and status of Welfare Program receiver).

association of extraversion with learning.

Table 4: Main results for Math

	(1)	(2)	(3)	(4)
Conscientiousness	0.103*** (0.016)	0.058*** (0.014)	0.072*** (0.015)	0.085*** (0.016)
Openness	0.092*** (0.022)	0.085*** (0.020)	0.046*** (0.017)	0.069*** (0.016)
Extraversion	-0.071*** (0.016)	-0.052*** (0.016)	-0.019 (0.016)	-0.024* (0.014)
Emotional Stability	0.028* (0.015)	0.026* (0.015)	0.023 (0.016)	0.031** (0.015)
Agreeableness	0.001 (0.019)	-0.006 (0.019)	-0.034** (0.017)	-0.044** (0.017)
School Fixed Effects	Yes	Yes	Yes	Yes
Control for mother's education & SES	Yes	Yes	Yes	Yes
Control for performance in 2013	No	Yes	Yes	Yes
Quarter	1	1	2	3
Observations	5417	5417	5417	5417

Notes: (i) Standard errors clustered at school level; (ii) * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; (iii) Both the constructs and the dependent variables are standardized with mean zero and unitary standard-deviation. Results regard students from the 1st grade of High School, interviewed during October 2013. Estimations are controlled for students' main characteristics (race, gender, age) and socioeconomic conditions (mother's education, indicator of whether student lives w/ mother, and status of Welfare Program receiver).

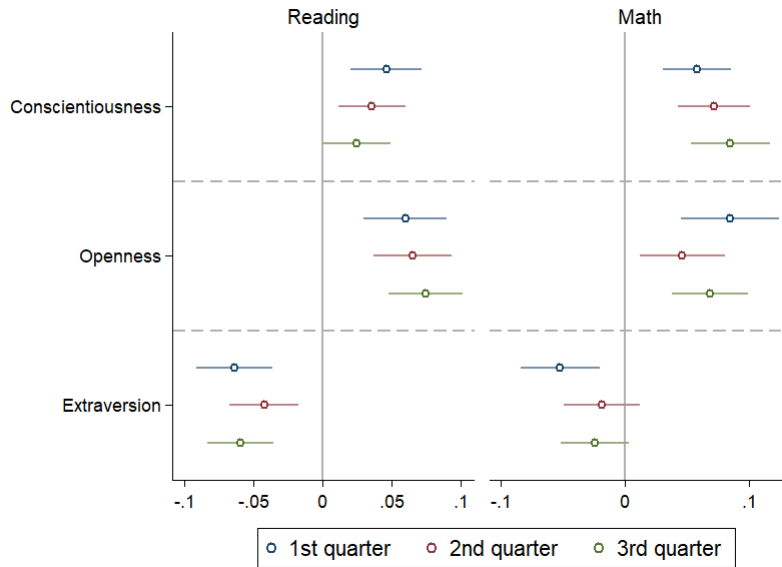


Figure 1: Impact of Conscientiousness, Openness and Extraversion

For what regards conscientiousness and openness, it is interesting to highlight that, even though those constructs are both positively correlated to reading and math, they have different impacts on these two cognitive skills. While conscientiousness seems to have larger impacts on math, openness is more predictive of reading scores. Conscientiousness refers to characteristics such as perseverance, discipline, endeavor and, responsibility, which are important characteristics in any activity that involves medium and long-term commitment, such as studying or working. Its positive impact, especially in math, might come from the behaviors associated with this construct, such as self-discipline, persistence and the capacity to delay rewards. Openness, in turn, refers to characteristics such as the desire for learning, intellectual engagement, the tendency to fantasize, creativity, and originality. Hence, its impact on cognitive skills, especially reading, seems natural.

Most important, though, is the fact that the impacts of these two traits are sustained over time: they do not seem to fade out from one quarter to another. Actually, the point estimates of conscientiousness and openness are increasing in time for math and reading, respectively. This means that not only social and emotional skills are contemporaneously correlated with cognitive skills, but one's current socioemotional traits have an impact on this person future outcomes, and such an impact seems cumulative over time for some traits.

	Mean of Reading & Math		
	(1)	(2)	(3)
Mean of Consc.& Openness	0.094***	0.075***	0.091***
	(0.014)	(0.013)	(0.012)
School Fixed Effects	Yes	Yes	Yes
Control for mother's education & SES	Yes	Yes	Yes
Control for performance in 2013	Yes	Yes	Yes
Quarter	1	2	3
Observations	5417	5417	5417

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Impact of Consc.& Openness (mean) on Mean of Reading & Math

5 Conclusion

The contemporaneous formation of socioemotional and cognitive skills and the simultaneous effects that these skills have on one another have prevented most of the works in the literature on skill formation to provide causal links, neither from socioemotional skills to cognitive skills, nor the other way around. The present work contributes to this literature by first, building a theoretical model for skills formation that allows for structural estimations of the contemporaneous impact of social and emotional traits on cognitive skills; and second, estimating a reduced form deviated from this theoretical model that estimates the impact of social and emotional skills on students' future school performance, controlling for contemporaneous feedback effects¹³. Even though previous works have already shown important associations between socioemotional traits and cognitive performance¹⁴, few works in this literature discussed issues of causality and identification as deeply as we do here.

The persistent impact of conscientiousness and openness on reading and math performance across time shows the importance of promoting and sustaining the acquisitions of such traits during school life. The worrisome low performance of Brazilian students could at least be minimized if policymakers implemented projects to increase students' levels of socio-emotional

¹³As stated before, futures versions of this work will bring also the structural estimation

¹⁴See, for instance, (Poropat, 2009; Martin, 1989; Lleras, 2008; Mischel et al., 1989; Duckworth and Seligman, 2005)

traits. Future research should investigate how public policies in developing countries could enhance the development of social and emotional skills, allowing schools to compensate for socioeconomic inequalities that harm cognitive skills accumulation and, as so, future success in life.

References

- Almlund, M., Duckworth, A. L., Heckman, J. J., and Kautz, T. D. (2011). Personality psychology and economics. Technical report, National Bureau of Economic Research.
- Autor, D. H. and Handel, M. J. (2013). Putting tasks to the test: Human capital, job tasks, and wages. *Journal of Labor Economics*, 31(S1):S59–S96.
- Autor, D. H., Katz, L. F., and Kearney, M. S. (2008). Trends in us wage inequality: Revising the revisionists. *The Review of economics and statistics*, 90(2):300–323.
- Autor, D. H., Levy, F., and Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly journal of economics*, 118(4):1279–1333.
- Balcar, J. (2014). Soft skills and their wage returns: Overview of empirical literature. *Review of Economic Perspectives*, 14(1):3–15.
- Busso, M., Bassi, M., Urzúa, S., and Vargas, J. (2012). *Disconnected: Skills, education, and employment in Latin America*. Inter-American Development Bank.
- Cunha, F., Heckman, J. J., and Schennach, S. M. (2010). Estimating the technology of cognitive and noncognitive skill formation. *Econometrica*, 78(3):883–931.
- De Raad, B. and Schouwenburg, H. C. (1996). Personality in learning and education: A review. *European Journal of personality*, 10(5):303–336.
- Deming, D. J. (2017). The growing importance of social skills in the labor market. *The Quarterly Journal of Economics*, 132(4):1593–1640.
- Duckworth, A. L. and Seligman, M. E. (2005). Self-discipline outdoes iq in predicting academic performance of adolescents. *Psychological science*, 16(12):939–944.
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., and Schellinger, K. B. (2011). The impact of enhancing students’ social and emotional learning: A meta-analysis of school-based universal interventions. *Child development*, 82(1):405–432.

- Lleras, C. (2008). Do skills and behaviors in high school matter? the contribution of noncognitive factors in explaining differences in educational attainment and earnings. *Social Science Research*, 37(3):888–902.
- Lundberg, S. (2017). Non-cognitive skills as human capital. In *Education, Skills, and Technical Change: Implications for Future US GDP Growth*. University of Chicago Press.
- Martin, R. P. (1989). Activity level, distractibility, and persistence: Critical characteristics in early schooling.
- Mischel, W., Shoda, Y., and Rodriguez, M. L. (1989). Delay of gratification in children. *Science*, 244(4907):933–938.
- Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological bulletin*, 135(2):322.
- Savelyev, P. and Tan, K. T. (2017). Socioemotional skills, education, and health-related outcomes of high-ability individuals. *American Journal of Health Economics*, (Just Accepted):1–73.
- Taylor, R. D., Oberle, E., Durlak, J. A., and Weissberg, R. P. (2017). Promoting positive youth development through school-based social and emotional learning interventions: A meta-analysis of follow-up effects. *Child development*, 88(4):1156–1171.